DRAFT RSET WHITE PAPER #8 – PCB Analytical Methods

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QUESTION/ISSUE: What methods should be used to evaluate PCB concentrations in sediments and tissues, and should the concentration determinations include Aroclor and/or Congener concentrations?

DISCUSSION: Although some degree of PCB Aroclor degradation can occur in sediments, in most instances the Aroclor can be identified based upon its analytical pattern. In tissues, PCB Aroclors undergo a much more significant degradation due to biological processes, making identification and quantification of parent Aroclors difficult. It is recommended that sediments are analyzed for PCB Aroclors, and tissue samples be analyzed for PCB Congeners to determine the extent of PCB contamination (see paper by Sutter and Michelsen for additional technical rationale regarding aroclor versus congener analysis). EPA Method 8082 (GC/ECD) will be used to analyze for Aroclors in sediment and may also be used to analyze congers in tissue. In instances where toxicological evaluation requires lower detection limits, EPA Method 1668 (Hi Res GC/MS) can be used. The selection of Method 8082 versus Method 1668 for PCB congener analysis will need to consider detection limits, cost, and commercial availability. Therefore, a final decision on method selection awaits the development of target tissue levels for PCB congeners by the Bioaccumulation Subcommittee.

REFERENCES: None.

RECOMMENDATION: Text and table revisions to specify methods of analysis for PCB congeners in tissue, pending development of target tissue levels for PCB congeners by the Bioaccumulation Subcommittee.

PROPOSED LANGUAGE:

Method	Detector	Detection limits	Cost	Analytes detected**	Comments
EPA 8082	ECD, Dual column for confirmation	~0.1-0.3 ug/kg	$225-350	~62 congeners with one injection (dual column), All 19 Coplanars	Possible interference include chlorinated pesticides, phthalates, polychlorinated terphenyls
EPA 680	Mass Spec	~0.2 ug/kg	$400-600		Some problems with

					identification due to co-elutions and presence of PCTs or other similar analytes
EPA 1668	Hi Res MS	~0.002-0.050 ug/kg	$750-1150	All 209 congeners, All 19 Coplanars	Most comprehensive based on detection selectivity
Krahn et al, 1994	HPLC/ Photodiode array	~1-4 ug/kg	$425-560	16 congeners, 12 Coplanars 77, 105, 118, 126, 128, 138, 156, 157, 169, 170, 180, and 189	Limited availability, Possible interference by PCTs, and PCNaphthalenes

*Typically dependent on the number of congeners requested.
**All methods include some co-elutions.
The 19 PCB co-planar congeners are:
Co-planars: Nos. 77, 81, 126, 169,
Mono-ortho coplanars: Nos. 60, 105, 114, 118, 123, 156, 157, 167, 189
Di-ortho co-planars: Nos. 128, 138, 158, 166, 170, 180

PCB Congener co-elution is not a static condition, and will vary between laboratories based on GC operating conditions, column conditions, etc., while still adhereing to the guidance put forth by the EPA methodology.

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